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## Inconsistency in two approaches to German affricates\*

Part 2: The Basic Inconsistency of German Affricates  
in Prinz & Wiese's approach

### Abstract

Irresolvable inconsistencies can often be solved within a new theoretical framework. CV phonology raised the hope that it could be void of the shortcomings characterising earlier approaches to the basic inconsistency of German affricates. Although Prinz & Wiese's (1991) approach is clearly better from several points of view than Wurzel's eclectic framework, the basic inconsistency of German affricates did not become solvable within this framework, either. The reason for this is, above all, that the conflicting test results could not be separated from each other satisfactorily, in a well-founded manner.

*Keywords:* inconsistency, affricates, CV phonology, p-model

## 4 Introduction

Rákosi (2014) formulated the *basic inconsistency of German affricates* as follows:

- (I) (a) Phonologically, German affricates are equivalent to single consonants.

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- (b) Phonologically, German affricates are equivalent to consonant combinations.

Rákosi (2014) provided a reconstruction and evaluation of Wurzel's resolution attempt to (I) with the help of the p-model by Kertész & Rákosi (2012) and revealed the causes of its failure. This paper will be devoted to the analysis of Prinz and Wiese's proposal that relies on a radically different theoretical background, as well as to the comparison of the two basically different treatments of (I) from a methodological point of view. Thus, it will focus on (P)(b) and (P)(c):

- (P) (a) *Why* is the basic inconsistency of German affricates *irresolvable* within Wurzel's approach?
- (b) Does it become *solvable* within Prinz and Wiese's approach?
- (c) Do the answers to (P)(a) and (P)(b) suggest generalisable methodological guidelines that may be applicable to the future treatment of inconsistency in linguistic theorising?

Since we resume our analyses presented in Rákosi (2014), the numbering of the sections, hypotheses and figures will be a direct continuation of the numberings of that paper.

## 5 On (P)(b)

### 5.1 *The reconstruction of Prinz and Wiese's attempt to solve the initial problem*

According to Prinz & Wiese (1991: 164ff.), on the *segmental level* segments are represented as bundles of phonological features. The features are arranged in a hierarchical structure and are linked together by a root node (R). On the *structural level*, CV-tiers (skeletal tiers) of syllable-internal positions comprise abstract C, V and X sequences that are the terminal elements of syllable structure, whereby C corresponds to a non-syllabic, V to a syllabic element, and X is an element that is not specified with respect to syllabicity. There is also a third level of phonological representation, the *level of syllables* (σ). These levels are supposed to be related by *association lines*:

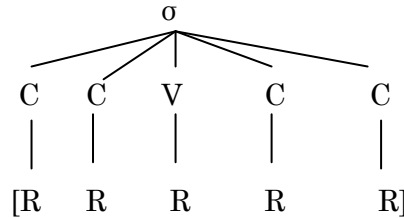


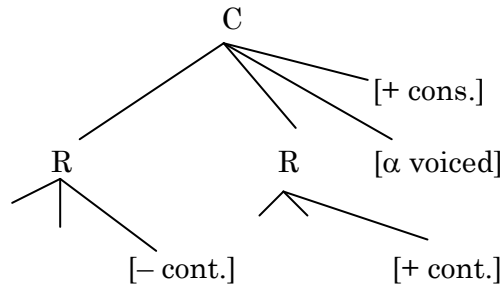
Figure 14

While Wurzel defined the term 'affricate' with the help of phonetic criteria, in the framework sketched above, Prinz and Wiese (1991: 168f.), starting from the proposal of Clements & Keyser (1983: 34), suggest the following definition of affricates:

- (7) Affricates are bisegmental (two-node) units on the segmental tier associated with one C position on the CV-tier.

In contrast to Wurzel (1981), Prinz and Wiese (1991) assume that there are 7 affricate candidates in German, i.e. sequences of plosive + fricative that include [ts], [pf], [tʃ], [ks], [ps], [pʃ] and [dʒ]. A further difference from Wurzel (1981) is that the authors do not presuppose that these consonant clusters should be tested collectively but they investigate their behaviour separately.

In the sense of (7), affricates can, on the one hand, be treated as single units, because they are associated with only one C position on the CV-tier. On the other hand, they are bisegmental clusters, because on the segmental level they consist of two root nodes. In other words, *affricates are monopositional and bisegmental consonant clusters*:

Figure 15<sup>1</sup>

Against this background, Prinz and Wiese re-evaluate (I) in the following way:

- (I<sub>P&W</sub>) (a) The German affricates [ts], [pf], [tʃ], [ks], [ps], [pʃ] and [dʒ] are monopositional on the CV-tier.  
 (b) The German affricates [ts], [pf], [tʃ], [ks], [ps], [pʃ] and [dʒ] are bisegmental clusters on the segmental tier.

In contrast to Wurzel, who tried to make a decision between (I)(a) and (I)(b), Prinz and Wiese (1991: 168) propose the maintenance of both members of (I). This means that they treat affricates as single units and as two-member configurations *at the same time* – although at a different level of representation. Accordingly, they explain the double-facedness of affricates by assuming that phonotactically they are equivalent to single consonants and segmentally they are combinations of consonants.

Prinz and Wiese presuppose a close relationship between (I<sub>P&W</sub>)(a) and (I<sub>P&W</sub>)(b), that is, between the bisegmentality and the monopositionality of the affricates:

While earlier one could only note that not all tests for affricate-status led to the same results, now this finding has become explainable: The bisegmentality of the affricates suggests that under certain circumstances an affricate may behave as a biphonemic cluster. Therefore, every positive result of a test

<sup>1</sup> According to Prinz & Wiese (1991), root nodes (R) are not identical to C-positions. Nevertheless, certain segmental features present in both members of the affricate may be associated directly with the (common) C-position such as [± consonantal] or [± voiced], while other features belong to the corresponding R-position such as [± continuant].

can be unconditionally used as an argument for the affricate status of the given cluster. A result is negative only if a potential affricate behaves as two units from a phonotactic point of view (Prinz & Wiese 1991: 170; our translation).

This formulation is, however, unclear. It is compatible with two different interpretations. The first says that affricates are basically monopositional but their bisegmental nature may, under certain circumstances, lead to a bipositional behaviour:

- (M1) (a) A segment cluster is an affricate in the sense of (7) if there are circumstances under which it behaves like a monopositional segment cluster – that is, if there is at least one test that shows it to be monopositional.
- (b) A segment cluster is not an affricate in the sense of (7) if it always behaves as a bipositional segment cluster – that is, if no test shows it to be monopositional.

According to the second interpretation the double-facedness and the conflicting results of earlier tests are due to the circumstance that affricates behave as two-member clusters on the segmental tier but are single units from a phonotactic point of view:

- (M2) (a) A segment cluster is an affricate in the sense of (7) if it behaves as a monopositional and bisegmental consonant cluster according to all tests.
- (b) A segment cluster is not an affricate in the sense of (7) if it behaves as a bipositional and bisegmental consonant cluster according to some tests.

(M2) stipulates much stricter criteria than (M1), since it requires that the consonant clusters behave uniformly in all tests, while (M1) permits conflicting test results. We will set aside this issue at this point and will turn back to it later in this section.

The acceptance of (IP&W) means that Prinz and Wiese *tolerate an inconsistency*, but this does not lead to logical chaos. In the p-model's terminology this indicates the application of the *Combinative Strategy* (see (x) in Section 2). That is, in this section we will show that the authors' argumentation aims at the maintenance of the two conflicting hypotheses simultaneously, but in a carefully separated way. Accordingly, first, the reconstruction of their argumentation should re-

sult in a situation in which both (IP&W)(a) and (IP&W)(b) are unanimously plausible statements in the sense of (i) in Section 2. Second, it should be always clear which piece of evidence and hypothesis is related to which member of (IP&W); there must be no overlap between their fields of application.

**Cycle 1:** In order to argue for (IP&W), Prinz & Wiese (1991: 169) consider the following hypotheses:

- (H1) (a)  $0 < |$  If in accordance with (IP&W)(b), affricates are bisegmental clusters on the segmental tier, then the segments which they consist of behave as the corresponding single segments.  $|_{PW} < 1$   
 (b)  $0 < |$  If in contrast to (IP&W)(b), affricates are monosegmental on the segmental tier, then the segments which they consist of have the feature  $[-\text{continuant}]$ .  $|_{PW} < 1$   
 (c)  $0 < |$  Single segments have the feature  $[+\text{continuant}]$ .  $|_{PW} < 1$

The source from which the plausibility value of these statements originates is Prinz & Wiese (1991), abbreviated as PW. The authors test (IP&W)(b) and (H1) with reference to the phenomenon called "degemination" as captured in (H2) and the data in (D9):

- (H2) (a)  $0 < |$  If two identical consonants occur adjacent to each other in a verb, then in certain cases the second of the two is deleted.  $|_{PW} < 1^2$   
 (b)  $0 < |$  If the two adjacent consonants are not identical, then the second is not deleted.  $|_{PW} < 1$

<sup>2</sup> (H2) is supported by the following analyses:

- |     |  |   |
|-----|--|---|
| (a) | $/k\alpha:t/ + /t/ \rightarrow [k\epsilon:t]$                  | ( <i>raten</i> – (sie) <i>rät</i> )     |
|     | $/t\kappa\epsilon:t/ + /t/ \rightarrow [t\kappa\epsilon:tt]$   | ( <i>treten</i> – (sie) <i>tritt</i> )  |
| (b) | $/le:z/ + /st/ \rightarrow [li:st]$                            | ( <i>lesen</i> – (du) <i>liest</i> )    |
|     | $/las/ + /st/ \rightarrow [l\epsilon:st]$                      | ( <i>lassen</i> – (du) <i>läßt</i> )    |
| (c) | $/k\alpha:t/ + /st/ \rightarrow [k\epsilon:tst]$               | ( <i>raten</i> – (du) <i>rätst</i> )    |
|     | $/t\kappa\epsilon:t/ + /st/ \rightarrow [t\kappa\epsilon:tst]$ | ( <i>treten</i> – (du) <i>trittst</i> ) |

Nevertheless, there are cases in which a [ə] is inserted as in the verb *reitet*. Prinz & Wiese (1991) does not stipulate the conditions under which degemination should occur and under which a [ə] gets inserted, respectively.

- (D9) (a)  $0 < |$  If the suffix /st/ is added to the verbal stem /karts/, then the word [kartst] is obtained (cf. *reizen* – (du) *reizt*).  $|_{PW} < 1$   
 (b)  $0 < |$  If the suffix /st/ is added to the verbal stem /zits/, then the word [zitst]<sup>3</sup> is obtained (cf. *sitzen* – (du) *sitzt*).  $|_{PW} < 1$

If we assume that affricates are monosegmental, then from this, as well as from (H1)(b) and (c), it follows that single segments and their counterparts in affricates cannot be treated as identical consonants. Consequently, the conditions for the process of degemination are not met. Thus, we obtain the following:

- (8)  $0 < |$  If affricates are monosegmental on the segmental tier (=  $\sim(\text{IP\&W})(b)$ ), then the segments which they consist of have the feature [–continuant].  $|_{PW} < 1$  (= (H1)(b))  
 $0 < |$  Single segments have the feature [+continuant].  $|_{PW} < 1$  (= (H1)(c))  
 $0 < |$  If the segments which affricates consist of have the feature [–continuant], while single segments have the feature [+continuant], then no degemination is possible when the suffix /st/ is added to the verbal stem /karts/ or /zits/.  $|_{PW} < 1$  (= (H2)(b))  
 $0 < |$  If no degemination is possible when the suffix /st/ is added to the verbal stem /karts/ or /zits/, then it is not possible that the word [kartst] and [zitst] is obtained, respectively.  $|_{PW} < 1$   
 $0 < |$  When the suffix /st/ is added to the verbal stem /karts/, then the word [kartst] is obtained, and when the suffix /st/ is added to the verbal stem /zits/, then the word [zitst] is obtained.  $|_{PW} < 1$  (= (D9)(a)-(b))  


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 $0 < |$  Affricates are not monosegmental on the segmental tier.  $|_{(8)} < 1$  (=  $\sim\sim(\text{IP\&W})(b)$ )

(8) indicates that the negation of (IP&W)(b) is implausible. This means that  $\sim(\text{IP\&W})(b)$  is p-inconsistent with (D9), (H1) and (H2).

The second inference shows, in contrast, that the assumption that the alveolar affricate has a bisegmental character is made plausible by (H1), (H2) and (D9):

<sup>3</sup> There is a misprint in Prinz & Wiese (1991: 169).

- (9) 0 < | If affricates are bisegmental clusters on the segmental tier (= (I<sub>P&W</sub>)(b)), then the segments which they consist of behave as the corresponding single segments. |<sub>PW</sub> < 1 (= (H1)(a))  
 0 < | If the segments which affricates consist of behave as the corresponding single segments, and the suffix /st/ is added to the verbal stem /karts/ or /zits/, then two identical consonants occur adjacent to each other. |<sub>PW</sub> < 1  
 0 < | If two identical consonants occur adjacent to each other when the suffix /st/ is added to the verbal stem /karts/ or /zits/, then the second /s/ has to be deleted. |<sub>PW</sub> < 1 (= (H2)(a))  
 0 < | If the suffix /st/ is added to the verbal stem /karts/, then the word [kartst] is obtained, and if the suffix /st/ is added to the verbal stem /zits/, then the word [zitst] is obtained. |<sub>PW</sub> < 1 (= (D9))
- 
- 0 < | Affricates are bisegmental clusters on the segmental tier. |<sub>(9)</sub> < 1 (= (I<sub>P&W</sub>)(b)).

Figure 16 summarizes our reconstruction of Prinz and Wiese's argumentation so far:

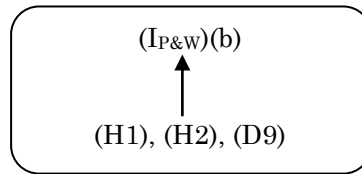


Figure 16

As a next step, Prinz & Wiese (1991: 170) extend the p-context by further pieces of information. They apply Wurzel's first structural rule (SR1) but they re-evaluate it in such a way that they relate it to phonotactic aspects:

- (H3) (a) 0 < | If a three-member stem-initial consonant cluster precedes a vowel /V/, then the last two members of this consonant cluster may also occur in the same position. |<sub>PW</sub> < 1  
 (b) 0 < | If a two-member stem-initial consonant cluster precedes a vowel /V/, then the second member of this consonant cluster may also occur in the same position. |<sub>PW</sub> < 1



At this point, Prinz and Wiese's argumentation matches the corresponding moves in Wurzel's argumentation (cf. Section 3.1). There is only one – but highly important – difference: while Wurzel's arguments related to (SR1) aimed at finding out whether affricates are mono- or bisegmental, Prinz and Wiese retrospectively re-evaluate this rule as being of a phonotactic nature and, accordingly, test whether affricate-candidates are monopositional on the CV-tier. For example, the counterparts of inferences (1) and (2) can be reconstructed as follows:

- (10)  $0 < | \text{If affricates are bipositional on the CV-tier } (= \sim(\text{I}_{\text{P\&W}})(a)), \text{ and } \textit{zwar} [\text{tsva:r}] \text{ is a German stem, then, according to (H3), the phoneme cluster } /sv\_/ \text{ must also exist in German. } |_{\text{PW}} < 1$   
 $0 < | \textit{zwar} [\text{tsva:r}] \text{ is a German stem. } |_{\text{PW}} < 1 (= (\text{D1})(a))$   
 $0 < | \text{No stem exists with the structure } [sv\_] \text{ in German. } |_{\text{PW}} < 1 (= (\text{D1})(b))$   


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 $0 < | \text{Affricates are not bipositional on the CV-tier. } |_{(10)} < 1 (= \sim\sim(\text{I}_{\text{P\&W}})(a))$
- (11)  $0 < | \text{If affricates are monopositional on the CV-tier } (= (\text{I}_{\text{P\&W}})(a)), \text{ and } \textit{zwar} [\text{tsva:r}] \text{ is a German stem, then, according to (H3)(b), the phoneme cluster } /va:\_/ \text{ must also exist in German. } |_{\text{PW}} < 1$   
 $0 < | \textit{zwar} [\text{tsva:r}] \text{ is a German stem. } |_{\text{PW}} < 1 (= (\text{D1})(a))$   
 $0 < | \text{There exists a stem of the structure } [va:\_] \text{ in German. } |_{\text{PW}} < 1 (= (\text{D1})(c))$   


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 $0 < | \text{Affricates are monopositional on the CV-tier. } |_{\text{PW}} < 1 (= (\text{I}_{\text{P\&W}})(a))$

In contrast to (H1) which concerned the segmental structure of affricates and was related to  $(\text{I}_{\text{P\&W}})(b)$ , the reformulation of Wurzel's first structural rule, that is, (H3) is of phonotactic nature and could be applied to test  $(\text{I}_{\text{P\&W}})(a)$ . Therefore, it seems to be reasonable to separate  $(\text{I}_{\text{P\&W}})(b)$  and  $(\text{I}_{\text{P\&W}})(a)$  as well as the linguistic data and inferences related to them from each other in the following way:

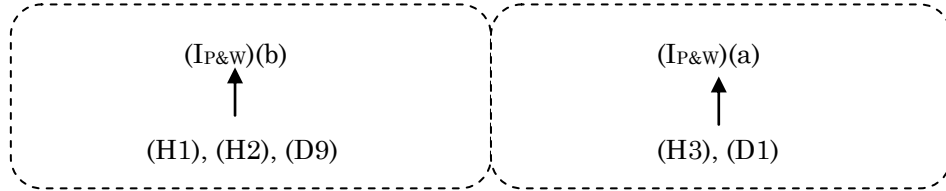


Figure 17

Figure 17 shows that the two p-context versions constitute together the entire p-context; that is, they are not rivals between which a decision has to be made but sets of information that have to be maintained parallelly. Since the data taken into consideration provided evidence in the sense of (v) in Section 2 for  $(IP\&W)(b)$  and  $(IP\&W)(a)$ , respectively, both hypotheses are plausible at the moment.

The re-evaluated version of Wurzel's second rule, (SR2), is the following hypothesis (see Prinz & Wiese 1991: 171):<sup>4</sup>

- (H4)  $0 < |$  If a consonant cluster which occurs stem-initially may also occur stem-finally in reverse order, then this consonant cluster cannot be regarded as a complex segment from a phonotactic point of view.  $|_{PW} < 1$

According to Prinz & Wiese (1991: 170f.),  $(IP\&W)(a)$  is p-consistent with both (H3) and (H4) and the linguistic data in the case of all affricate-candidates, while  $\sim(IP\&W)(a)$  is p-inconsistent with them in several ways. They make use of the following data:

- (D10)  $0 < |$  The sequences  $/\_fp/$ ,  $/\_jp/$  and  $/\_ft/$  cannot occur stem-finally.  $|_{PW} < 1$

Figure 18 summarizes the results obtained so far:

<sup>4</sup> See also Wiese (1996: 265f.) where (H4) is supported by the sonority principle.

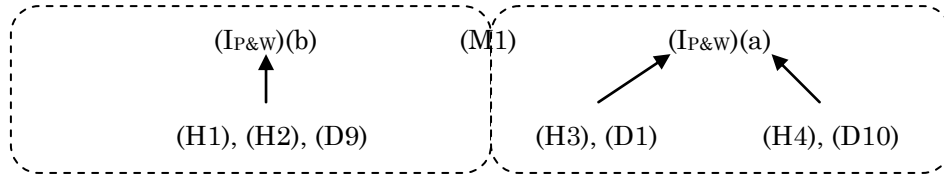


Figure 18

Nevertheless, we must not forget that – as Prinz & Wiese (1991: 171) also remark – /ts/, /ks/ and /ps/ have mirror-image stem-final counterparts. Therefore, if we do not reduce our data set to the elements of (D10) but take into consideration all relevant data, then we will find that the extended data set and (H4) are, in the case of /ts/, /ks/ and /ps/, inconsistent with (Ip&w)(a).

Now we can turn back to the distinction we have made earlier between (M1) and (M2). In particular, the evaluation of this situation reveals that Prinz and Wiese commit themselves to (M1), because they take into consideration only the positive outcomes of the test. In order to capture this finding, (M1) will be added to the figures representing the current state of the p-context.

The next criterion applied by Prinz and Wiese goes back to Trubetzkoy's (1939: 50-55) first rule:<sup>5</sup>

- (12) A consonant cluster is monophonemic only if its components belong to the same syllable.<sup>6</sup>

Prinz and Wiese modify (12) in the following way:

- (H5)  $0 < |A$  consonant cluster is monopositional on the CV-tier only if it cannot be split up in such a way that its first component belongs to the preceding and the second to the subsequent syllable.  $|_{PW} < 1$

Prinz & Wiese (1991: 172) rely on the following contrasts:

<sup>5</sup> Trubetzkoy considers six criteria, on the basis of which the bi- or monophonemic nature of affricates can be decided. Prinz and Wiese discuss only two of them, because they assume that the remaining four are less relevant.

<sup>6</sup> Thus, affricates are tautosyllabic, because both of their components must occur in the same syllable.

- (D11) (a)  $0 < |$  [kʊp-fɐ] is incorrect, while [kʊp-lɐ] is correct.  $|_{PW} < 1$   
 (b)  $0 < |$  [hɔp-sən] is incorrect, while [hɔp-la] is correct.  $|_{PW} < 1$   
 (c)  $0 < |$  [bʊk-sə] is incorrect, while [bʊk-lɪç] is correct.  $|_{PW} < 1$   
 (d)  $0 < |$  [kat-sən] is incorrect, while [kat-Rin] is correct.  $|_{PW} < 1$   
 (e)  $0 < |$  [gRap-fən] is incorrect, while [gRap-toli:t] is correct.  $|_{PW} < 1$   
 (f)  $0 < |$  [kʊt-fəʁ] is incorrect, while [bʊt-ləʁ] is correct.  $|_{PW} < 1$

For example, with the help of (D11)(a), the following pair of inferences can be drawn:

- (13)  $0 < |$  The consonant cluster /pf/ is monopositional on the CV-tier (= (I<sub>P&W</sub>)(a)) only if it cannot be split up in such a way that its first component belongs to the preceding and the second to the subsequent syllable.  $|_{PW} < 1$  (= (H5))  
 $0 < |$  [kʊp-fɐ] is incorrect.  $|_{PW} < 1$  (= (D11)(a))  
 $0 < |$  If [kʊp-fɐ] is incorrect, then the consonant cluster /pf/ cannot be split up in a way that its first component belongs to the preceding and the second to the subsequent syllable.  $|_{PW} < 1$   


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 $0 < |$  The consonant cluster /pf/ is monopositional on the CV-tier.  $|_{(13)} < 1$  (= (I<sub>P&W</sub>)(a))
- (14)  $0 < |$  The consonant cluster /pl/ is monopositional on the CV-tier only if it cannot be split up in such a way that its first component belongs to the preceding and the second to the subsequent syllable.  $|_{PW} < 1$  (= (H5))  
 $0 < |$  If [kʊp-lɐ] is correct, then the consonant cluster /pl/ can be split up in such a way that its first component belongs to the preceding and the second to the subsequent syllable.  
 $0 < |$  [kʊp-lɐ] is correct.  $|_{PW} < 1$  (= (D11)(a))  


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 $0 < |$  The consonant cluster /pl/ is not monopositional on the CV-tier.  $|_{(14)} < 1$

The structure of (13) is similar to that of (2) and (4); thus, it makes (I<sub>P&W</sub>)(a) more plausible. (14) affords further support for (H5) because it is in harmony with the hypothesis that besides affricates, there are no further segment clusters that are monopositional from a phonotactic point of view. Figure 19 summarises the results of our reconstruction of Prinz and Wiese's argumentation:

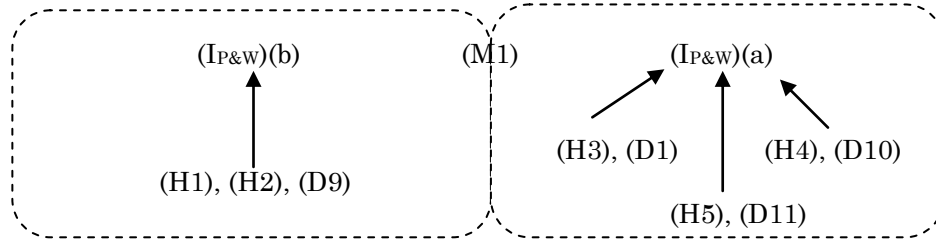


Figure 19

Prinz and Wiese's fifth argument is rooted in the following rule, whose original version was put forward by Trubetzkoy, too:

- (15) A cluster has to be evaluated as the realisation of a single phoneme if it occurs in positions in which no phoneme clusters are allowed in the language at issue.

In Prinz and Wiese's approach, (15) is retrospectively re-evaluated as (H6):

- (H6)  $0 < |$  If a segment cluster occurs in positions in which bipositional segment clusters are not allowed, then it is monopositional on the CV-tier.  $|_{PW} < 1$

Prinz & Wiese (1991: 173) rely on the following hypothesis and data:

- (H7)  $0 < |$  In a syllable only two non-syllabic positions are allowed pre- and postvocally.  $|_{PW} < 1$
- (D12) (a)  $0 < |$  /Rumpf/ and /pflaumə/ are German words.  $|_{PW} < 1$   
 (b)  $|$  *zwei* is a German word.  $|_{PW} < 1$   
 (c)  $0 < |$  /tʃ/ and /ps/ can follow long vowels.  $|_{PW} < 1$

With the help of (H6), (H7) and (D12), the following plausible inference can be drawn, among others:

- (16)  $0 < |$  In a syllable only two non-syllabic positions are allowed pre- and postvocally.  $|_{PW} < 1$  (= H7)  
 $0 < |$  /Rumpf/ and /pflaumə/ are German words.  $|_{PW} < 1$  (= D12)  
 $0 < |$  If in a syllable only two non-syllabic positions are allowed pre- and postvocally, further /Rumpf/ and /pflaumə/ are German words, then the segment cluster /pf/ occurs in positions where bipositional segment clusters are not allowed.  $|_{PW} < 1$   
 $0 < |$  If a segment cluster occurs in positions where bipositional segment clusters are not allowed, then it is monopositional on the CV-tier.  $|_{PW} < 1$  (= H6)  


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 $0 < |$  The segment cluster /pf/ is monopositional on the CV-tier.  $|_{(16)} < 1$

Since the conclusion of (16) is a special case of (IP&W)(a), this inference increases the plausibility value of (IP&W)(a). Prinz & Wiese (1991: 173) show that similar arguments can be obtained with respect to /ts/, /tʃ/ and /ps/. This results in the following picture:

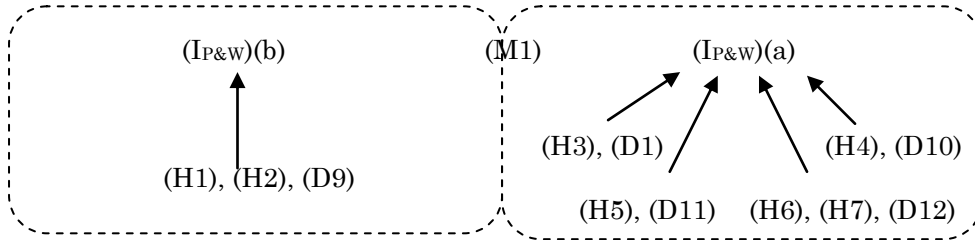


Figure 20

Prinz and Wiese do not touch upon the question of whether (H6) can be applied to [ks], [pf], and [dʒ].

The sixth argument is based on the following regularities and data:

- (H8)  $0 < |$  In monomorphemic words the vowel [ə] is inserted before a consonant if and only if the consonant would be otherwise unsyllabified.  $|_{PW} < 1$

- (H9) (a)  $0 < |$  According to the principle of sonority hierarchy, the second member of the consonant clusters /ts/, /pf/, /tʃ/, /ks/, /ps/, /pʃ/ and /dʒ/ is unsyllabified in word-final position.  $|_{PW} < 1$   
 (b)  $0 < |$  According to the principle of sonority hierarchy, the second member of word-final obstruent + sonorant clusters is unsyllabified.  $|_{PW} < 1$
- (D13) (a)  $0 < |$  The phonological structure of the word *Netz* is [nɛts] and not [nɛtəs].  $|_{PW} < 1$   
 (b)  $0 < |$  The phonological structure of the word *Rumpf* is [Rumpf] and not [Rumpəf].  $|_{PW} < 1$   
 (c)  $0 < |$  The phonological structure of the word *Matsch* is [matʃ] and not [matəʃ].  $|_{PW} < 1$   
 (d)  $0 < |$  The phonological structure of the word *Keks* is [ke:ks] and not [ke:kəs].  $|_{PW} < 1$   
 (e)  $0 < |$  The phonological structure of the word *Mumps* is [mumps] and not [mumpəs].  $|_{PW} < 1$   
 (f)  $0 < |$  The phonological structure of the word *hübsch* is [hypʃ] and not [hypəʃ].  $|_{PW} < 1$   
 (g)  $0 < |$  The phonological structure of the word *Mantel* is [mantəl].  $|_{PW} < 1$   
 (h)  $0 < |$  The phonological structure of the word *Atem* is [a:təm].  $|_{PW} < 1$

The inferences presented by Prinz and Wiese can be reconstructed as follows:

- (17)  $0 < |$  According to the principle of sonority hierarchy, the second member of the segment cluster /ts/ is unsyllabified in word-final position.  $|_{PW} < 1$  (= (H9)(a))  
 $0 < |$  If the second member of the segment cluster /ts/ is unsyllabified in word-final position, then a [ə] has to be inserted before the unsyllabified /s/ in the word *Netz* whenever it would be otherwise unsyllabified.  $|_{PW} < 1$  (= (H8))  
 $[0 < |$  If the segment cluster /ts/ is bipositional on the CV-tier (=  $\sim(\text{I}_{P\&W})(a)$ ), then it is possible to insert a [ə] can be before the unsyllabified /s/ in the word *Netz*.  $|_{PW} < 1]$ <sup>7</sup>

<sup>7</sup> '[ ]' means that this hypothesis is a latent background assumption.

0 < |No [ə] can be inserted before the unsyllabified /s/ in *Netz*. |<sub>PW</sub> < 1 (= (D13)(a))

0 < |Either the segment cluster /ts/ is not bipositional on the CV-tier (= ~(I<sub>P&W</sub>)(a)), or the principle of sonority hierarchy is faulty. |<sub>(17)</sub> < 1

Similar plausible inferences can be drawn in the case of all affricate-candidates. Obstruent + sonorant clusters, in contrast, behave differently. The conclusion of (18) reinforces the principle of sonority hierarchy referred to in (H9), because its application led to a correct prediction:

(18) 0 < |According to the principle of sonority hierarchy, the second member of word-final obstruent + sonorant clusters is unsyllabified. |<sub>PW</sub> < 1 (= (H9)(b))

0 < |If the second member of word-final obstruent + sonorant clusters is unsyllabified in word-final position, then in monomorphemic words the vowel [ə] has to be inserted before the sonorant. |<sub>PW</sub> < 1 (= (H8))

0 < |A [ə] is inserted before the sonorants in the words *Mantel* and *Atem* (cf. [mantəl], [a:təm]). |<sub>PW</sub> < 1 (= (D13)(g)-(h))

0 < |The principle of sonority hierarchy is correct. |<sub>(18)</sub> < 1

Thus, Prinz & Wiese (1991: 173f.) propose to react to the conclusion of (17) in such a way that they give up the assumption that the consonant clusters in (H9)(a) are bipositional on the CV-tier. The next task is, of course, to investigate the opposite assumption. If these consonant clusters are monopositional, then their two segments are connected by association lines to the same position on the CV-tier. Therefore, if the vowel [ə] is inserted between them, then the following constellation emerges, for example, in the case of /ts/:

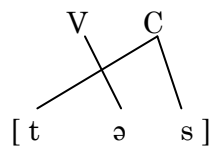


Figure 21



In connection with association lines, however, the following hypothesis is accorded high plausibility in the literature:

(H10)  $0 < | \text{Association lines cannot cross each other.} |_{PW} < 1$

Thus Prinz and Wiese argue that the assumption that affricates are monopositional leads to correct predictions like in (19):

- (19)  $0 < | \text{According to the principle of sonority hierarchy, the second member of the segment cluster /ts/ is unsyllabified in word-final position.} |_{PW} < 1 (= (H9)(a))$   
 $0 < | \text{If the second member of the segment cluster /ts/ is unsyllabified in word-final position, then a [ə] has to be inserted before the unsyllabified /s/ in the word } Netz. |_{PW} < 1 (= (H8))$   
 $0 < | \text{If the segment cluster /ts/ is monopositional on the CV-tier (= (I<sub>P&W</sub>)(a)), and the vowel [ə] got inserted before the segment /s/ in the word } Netz, \text{ then the association lines of [ə] and [t] would cross each other.} |_{PW} < 1$   
 $0 < | \text{Association lines cannot cross each other.} |_{PW} < 1 (= (H10))$   


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 $0 < | \text{The vowel [ə] cannot be inserted before the segment /s/ in the word } Netz. |_{(19)} < 1 (= (D13)(a))$

Figure 22 summarises the results of our reconstruction so far:

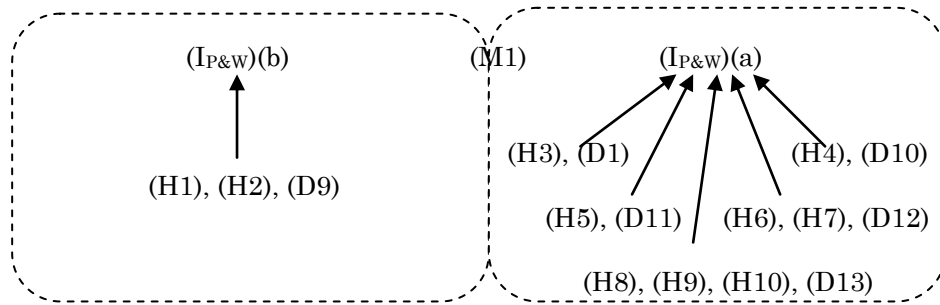


Figure 22

The seventh criterion is an external one and concerns the written form of consonant clusters:

- (H11)  $0 < |$  If a consonant cluster can be associated with one grapheme, then it has a monophonemic character on the CV-tier.  $|_{PW} < 1$

Prinz & Wiese (1991) refer to the following data:

- (D14) (a)  $0 < |$  The consonant cluster /ts/ is associated with the grapheme <z>.  $|_{PW} < 1$   
 (b)  $0 < |$  The consonant cluster /ks/ is associated with the grapheme <x>.  $|_{PW} < 1$   
 (c)  $0 < |$  The consonant cluster /tʃ/ is associated with the grapheme <c>.  $|_{PW} < 1$   
 (d)  $0 < |$  The consonant cluster /dʒ/ is associated with the grapheme <j>.  $|_{PW} < 1$

It is easy to see that (H11) and (D14) provide further support for  $(I_{P\&W})(a)$ , because (D14) is evidence for  $(I_{P\&W})(a)$  in the sense of (v) in Section 2. Nevertheless, similarly to the application of (H4), we have to face a situation where some affricate-candidates do not follow the supposed linguistic rule. That is, as Prinz & Wiese (1991: 174) note, [pf], [ps], and [pj] cannot be associated with one grapheme in German. Here, again, Prinz and Wiese's strategy seems to correspond to (M1). And in fact, Prinz & Wiese (1991) summarise their results in such a way that since all investigated consonant clusters meet at least the half of the criteria, they have to be regarded as affricates. Figure 23 shows the final p-context of Prinz & Wiese's (1991) argumentation:

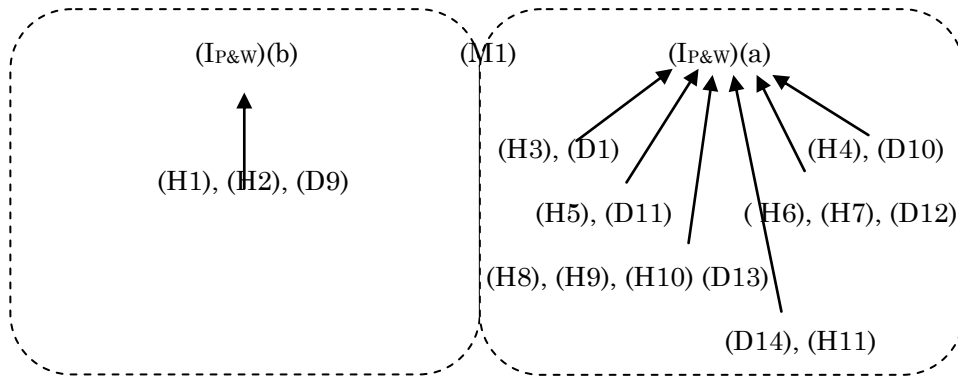


Figure 23

At this point we might think that Prinz & Wiese (1991) provided the resolution (in the sense of (vi) in Section 2) of the *basic inconsistency of German affricates* (cf. Section 3.1). They seem to have arrived at a consistent set of data and hypotheses on the basis of a considerably wider set of data and criteria than was the case with Wurzel (1981). The idea of keeping both members of (I) but carefully separating their field of application seems to be a good explanation of the seemingly contradictory nature of German affricates. It seems to be well-founded from a linguistic point of view as well as to be correct from a metatheoretical and logical point of view in the sense of (x) and (xi) in Section 2. Therefore, the tolerance of this inconsistency seems to be reasonable and tenable.

Nevertheless, Prinz and Wiese's argumentation remains problematic.

First, they make use of Wurzel's (1981) structural rules (SR1) and (SR2) in such a way that they associate both rules with the segmental tier instead of different tiers. From this it follows that Prinz & Wiese's (1991) argumentation contains irresolvable inconsistencies, too. The crucial question in this regard seems to be whether one should be ready to accept the methodological rule (M1). The first decisive point is that it is not clear why affricates might behave sometimes as monopositional segment clusters but in certain cases as bipositional clusters. Prinz and Wiese do not identify the circumstances of the occurrence of these cases. Therefore, the question emerges whether there is a difference between this strategy and the reference to "exceptions", used for example, by Wurzel.

The second, and more basic, problem is that it is not clear whether monopositionality and bipositionality can be treated, in contrast to mono- vs. biphonemicity, as a non-contrary pair. Therefore, it seems to be well-motivated to consider how Prinz & Wiese's (1991) argumentation can be retrospectively re-evaluated in order to find out whether the application of (M2) and the resolution of the inconsistencies just mentioned is possible.

## 5.2 *The additional retrospective re-evaluation of Prinz & Wiese's argumentation*

**Cycle 2:** The most questionable aspect of Prinz & Wiese's (1991) argumentation is that it relies on (M1). Therefore, this methodological background assumption should be given up. At the same time, (M2)

and the data put aside by Prinz & Wiese (1991) may be made use of. The latter include the following items:

- (D15)  $0 < |$ The sequences /\_st/, /\_sk/ and /\_sp/ can occur stem-finally. $|_{PW} < 1$
- (D16) (a)  $0 < |$ The consonant cluster /pf/ is associated with two graphemes. $|_{PW} < 1$   
 (b)  $0 < |$ The consonant cluster /ps/ is associated with two graphemes. $|_{PW} < 1$   
 (c)  $0 < |$ The consonant cluster /pʃ/ is associated with four graphemes. $|_{PW} < 1$

The formulation of (H4) clearly indicates that consonant clusters which occur in a stem-initial position and may occur in reverse order stem-finally, cannot be regarded as affricates if this rule is accepted. Therefore, /ts/, /ks/ and /ps/ are, according to this criterion as well as the data in (D15), not affricates. This finding is in conflict with Prinz & Wiese's statement (1991: 171) according to which these data do not provide evidence against the affricate-status of these three segment clusters and thus questions its tenability. Similarly, the data in (D16) are not compatible with the assumption that the consonant clusters in /pf/, /ps/ and /pʃ/ are affricates in the sense of (7).

As Figure 24 shows, (I<sub>P&W</sub>)(a) is p-inconsistent with the above data and the accepted hypotheses; therefore, the resulting p-context cannot be regarded as a solution of the initial p-problem:

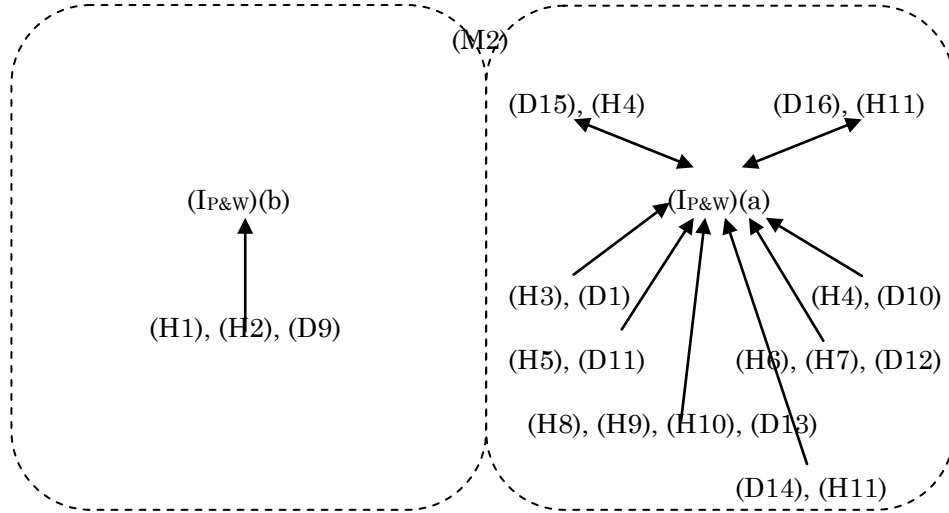


Figure 24

**Subcycle 1:** Wiese (1996) mentions in a footnote a linguistic datum that casts doubt on the plausibility of (H2) applied in Section 3.1:

- (D17)  $0 < | \text{In the case of the verb } \textit{bersten}, \text{ the form } [\text{birst}] \text{ results from the deletion of the consonant cluster } /st/: /birst/ + /st/ \rightarrow [\text{birst}]. |_{PW} < 1$

(D17) captures a case in which the process of degemination involves a two-member segment cluster. Thus, adding (D17) to our data set offers three options. The first possibility is that */st/* is regarded as a monosegmental and bipositional cluster. This alternative is clearly unacceptable, since from other points of view, */st/* does not behave as a monosegmental cluster. The second option is that */st/* is, similarly to the affricates, monopositional on the CV-tier. Wiese (1996) raises this hypothesis. From this Kager (1997) concludes, however, that degemination cannot work solely on the segmental level but that the CV-tier seems to be involved, too. Moreover, it is not clear why (H2) is related to the segmental tier in the case of single consonants such as */t/* or */s/* and to the CV-tier with */st/*. The third possibility is that (H2) is modified in such a way that it can be applied to segment clusters, too.

**Subcycle 2:** The application of (H4) raises further concerns. It is instructive to compare the way (SR2) and (H4) have been formulated:

- (SR2)  $0 < |$  If the phoneme cluster  $/C_1C_2\_/$  occurs formative-initially, then there exists a formative in which the phoneme cluster  $/\_C_2C_1/$  occurs formative-finally.  $|_W < 1$
- (H4)  $0 < |$  If a consonant cluster which occurs stem-initially may also occur stem-finally in reverse order, then this consonant cluster cannot be regarded as a complex segment from a phonotactic point of view.  $|_{PW} < 1$

While (SR2) sets up a criterion which should be met by every two-member stem-initial consonant cluster, (H4) pertains only to a subset of this group. Namely, it makes a claim about stem-initial consonant clusters that may occur in a stem-final position in reverse order, too. Thus, Prinz and Wiese narrow down Wurzel's (SR2) in a way that makes it possible to take into consideration the behaviour of only the two segments within an affricate-candidate, but they pass over the application of the "mirror-image rule" on, for example, word-initial segment clusters consisting of an affricate-candidate plus a consonant. This motivates the reformulation of (H4) as follows:

- (H4')  $0 < |$  If a two-positional consonant cluster occurs stem-initially, then it has to occur also stem-finally in reverse order.  $|_R < 1$

However, a similar p-problem arises with respect to (H4') as Wurzel's (SR2) in Section 3.2. Thus, (D18) and (H4') provide counter-arguments against (IP&W)(a):

- (D18) (a)  $0 < |$  There are stems with a stem-initial consonant cluster  $/tʃv/$  (i.e., *zwar*) but there is no stem with word-final segment cluster  $/vʃt/$ .  $|_R < 1$
- (b)  $0 < |$  There are stems with a stem-initial segment cluster  $/pʃl/$  (i.e., *Pflaume*) but there is no stem with word-final segment cluster  $/lʃp/$ .  $|_R < 1$

The counterpart of (5) is, for example, this inference:

- (20)  $0 < |Pflaume$  is a German word with the stem-initial segment cluster /pfl/.  $|_R < 1$  (= (D18)(b))  
 $0 < |$  If the segment cluster /pf/ is monopositional on the CV-tier (= (I<sub>P&W</sub>)(a)), and *Pflaume* is a German word with the stem-initial segment cluster /pfl/, then the two-positional consonant cluster /pfl/ occurs stem-initially.  $|_R < 1$   
 $0 < |$  If the two-positional consonant cluster /pfl/ occurs stem-initially, then there is a stem with stem-final segment cluster /vts/.  $|_R < 1$  (= (H4')).  
 $0 < |$  There is no stem with stem-final segment cluster /pfl/.  $|_R < 1$  (= (D18)(b))  


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 $0 < |$  The phoneme cluster /pf/ is not monopositional on the CV-tier.  $|_{(20)} < 1$  (=  $\sim$ (I<sub>P&W</sub>)(a))

Adding (H4'), (D18) and (20) to the information state captured in Figure 24 results in an increased amount of p-inconsistency:

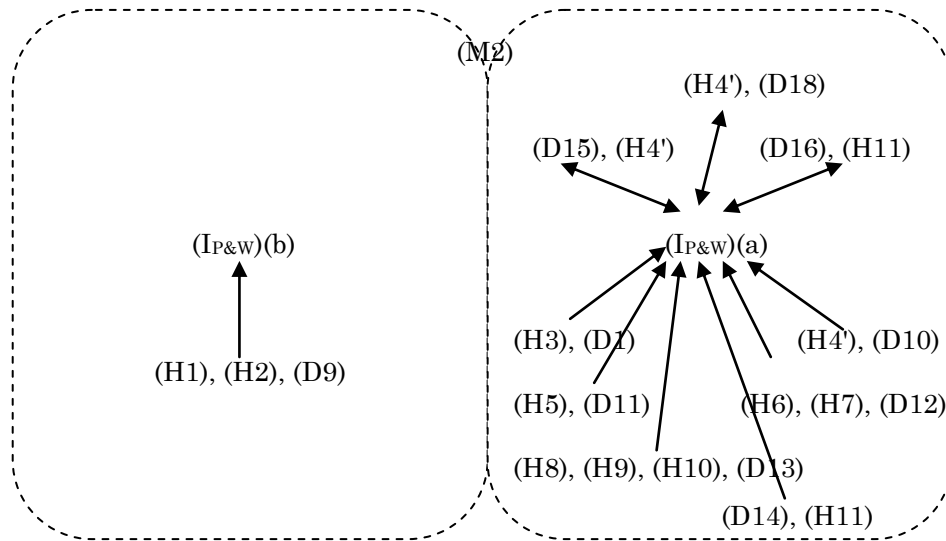


Figure 25

**Subcycle 3:** Kloeke (1982: 42) presents data which are in conflict with (H5) & (I<sub>P&W</sub>)(a):

- (D19) (a)  $0 < |$  si.[ts]en is incorrect, while si[t.s]en is correct.  $|_K < 1$   
 (b)  $0 < |$  hü.[pf]en is incorrect, while hü[p.f]en is correct.  $|_K < 1$

Dogil & Jessen (1989: 241) conducted a series of experiments in order to find out whether the data in (D19) are reliable – to be more exact, whether there is a reliable source that is capable of assigning a positive plausibility value to them. They found that most participants evaluated the forms *sie.[ts]en* (*siezen*) (where there is a long vowel before the affricate) and *infi.[ts]ie.ren* to be correct, while they had considerable difficulties with *sitzen* (where there is a short vowel before the affricate) and said that the syllabification is "somehow vague". These findings question the reliability of the data in (D11), and, as a consequence, they prevent the testing of (H5). Moreover, they require the involvement of experimental data in connection with the behaviour of other affricate-candidates after short vowels, since Kloeke's and Dogil and Jessen's investigations covered only /ts/ and /pf/. After the rejection of (D11), we obtain the following p-context:

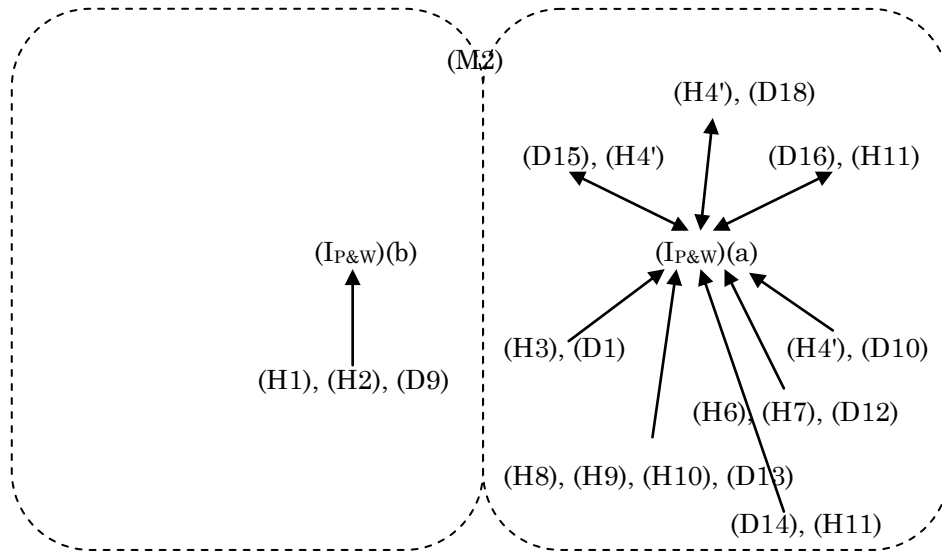


Figure 26

**Subcycle 4:** Hall (1991) presents a counter-argument against (H8). The starting point of his argumentation consists of the following data and hypothesis:



- (D20) (a)  $0 < |$  The phonological structure of the word *Akt* is [akt] and not [akət].  $|_H < 1$   
 (b)  $0 < |$  The phonological structure of the word *Abt* is [abt] and not [abət].  $|_H < 1$
- (H12)  $0 < |$  According to the principle of sonority hierarchy, the second member of the consonant clusters /kt/ and /pt/ is unsyllabified in word-final position.  $|_H < 1$

On (D20) and (H12), the following inference can be built:

- (21)  $0 < |$  According to the principle of sonority hierarchy, the second member of the consonant clusters /kt/ and /pt/ is unsyllabified in word-final position.  $|_H < 1$  (= (H12)).  
 $0 < |$  If the second member of the segment cluster /kt/ and /pt/ is unsyllabified in word-final position, then, according to (H8), a [ə] will be inserted before the unsyllabified /t/ in the word *Akt* and *Abt*.  $|_H < 1$   
 $0 < |$  No [ə] can be inserted before the unsyllabified /t/ in *Akt* and *Abt*.  $|_H < 1$  (= (D20))  


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 $0 < |$  (H12) or (H8) is not correct.  $|_{(21)} < 1$

Hall (1991: 311) proposes to give up (H8) and replace it with the following hypothesis:

- (H8')  $0 < |$  In monomorphemic words, the vowel [ə] is inserted before a *sonorant* if and only if this sonorant would be otherwise unsyllabified.  $|_H < 1$

The application of (H8') instead of (H8) makes the inference (17) dysfunctional while it does not undermine (18). From this Hall (1991) concludes that (19) is pointless, because in the case of stem-final affricate-candidates, the conditions of the application of (H8') do not hold. Thus, the reference to Schwa-epenthesis provides evidence neither for nor against the bisegmental and monopositional analysis of the affricate-candidates. This motivates the rejection of (H8):

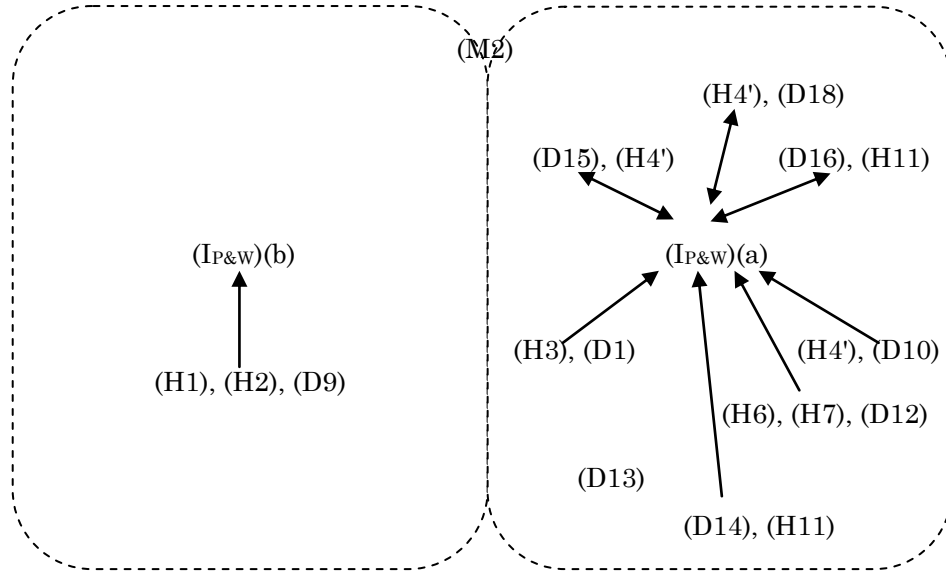


Figure 27

**Subcycle 5:** We may try to give up  $(H4')$  and  $(H11)$ . As we have seen earlier in this section, there is a considerable amount of counter-evidence against them, and there is no explanation of their disobedient behaviour at our disposal. In this way, the acceptance of  $(Ip\&w)(a)$  and  $(b)$  leads to a consistent set of data and hypotheses:

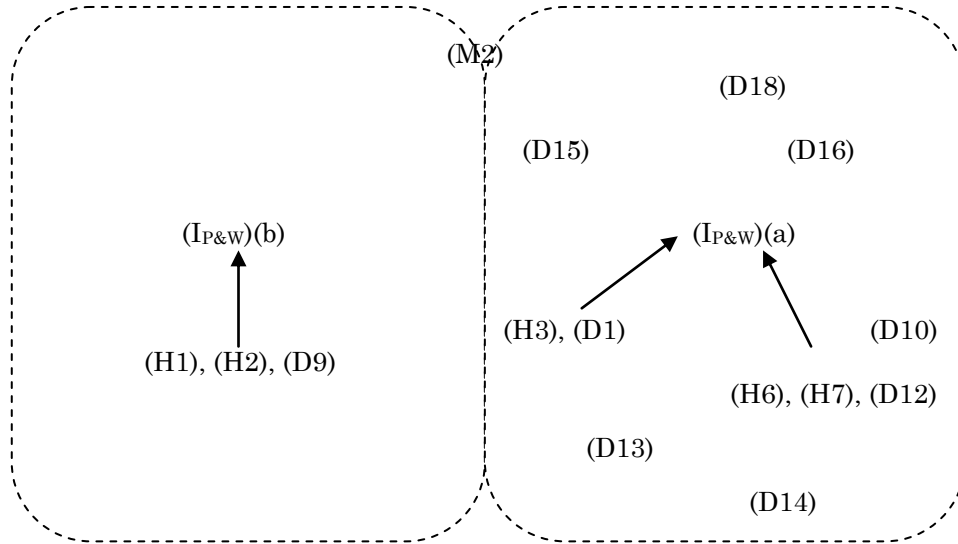


Figure 28

Nevertheless, there is the same drawback in connection with this step as there was in the case of a similar proposal during the revision of Wurzel's (1981) argumentation: the information loss is so great that this solution cannot be regarded as satisfactory, either.

**Subcycle 6:** In order to reduce the information loss, one may try to extend the set of data and hypotheses by new data types such as diachronic data (see, for example, Kloeke 1982: 43ff., Griffen 1981), data about alternations (Kloeke 1982: 42ff.), further criteria by Trubetzkoy, other phonotactic restrictions, dialectal evidence, and functional arguments (Dogil & Jessen 1989: 251f.).

**Subcycle 7:** Since, as we have seen in Section 5.1, Prinz & Wiese (1991) test the behaviour of the affricate candidates separately, it might be fruitful to check the criteria on them again and decide on their evaluation *one by one*.

**Subcycle 8:** Phonetic experiments may provide data that could motivate new conceptions of affricates and contribute to the testing of their applicability.

**Subcycle 9:** Dogil & Jessen's (1989) experimental results led to the idea of representations capable of taking into consideration the position of the affricate-candidate (word-initial, word-final, word-internal) as well. This might be a very important step because if it turns out that the monopositional and the bipositional behaviour of the affricate-candidates depends on the position of the given segment cluster, then a more refined and less inconsistent theory may arise. Moreover, the context-sensitivity of the affricates might lead to the further differentiation of their inner structure; for an approach making use of this idea, see Dogil & Jessen (1989: 272).

Our analysis of Prinz and Wiese's approach yields the following conclusions:

- (22) (a) The solution proposed by Prinz and Wiese cannot be regarded as the resolution of (I).
- (b) There is no solution(-candidate) which is satisfactory from every point of view.
- (c) A pivotal point of Prinz and Wiese's argumentation was the reliance on the methodological rule (M1). Its application, however, raises similar concerns as the reference to "exceptions", as we have seen in (SP)(a) in Section 3.2, in connection with Wurzel (1981):
  - References to "certain circumstances" under which affricate-candidates may behave as monopositional clusters without clarifying the nature of these circumstances would mean that the theory is not capable of specifying the conditions that should be met whenever a monopositional and a bipositional behaviour can be expected, respectively.
  - The tolerance of exceptions could be judged to be fully legitimate if one were capable of specifying the contexts in which "regular" behaviour can be expected and those in which "disobedience" should appear. In this way, an at least partial explanation of the distribution of "regular" and "irregular" instances would be obtained.
  - In contrast, the reference to "exceptions" without providing such explanations may lead to inconsequentiality. It may occur that one does not deem a segment cluster to be an affricate even if it violates some rule,

while in other cases one keeps the affricate-candidate despite its failing a test and declares pieces of counter-evidence as the result of exceptional circumstances. For example, since the initial consonant clusters /kn/, /kv/, /fv/ and /fm/ do not have mirror-image stem-final counterparts, they also should be regarded as affricates on the basis of hypothesis (H2) and the methodological rule (M1).

- (d) The reconstruction and re-evaluation of Prinz & Wiese's (1991) argumentation provides further support for our idea that inconsistency is not the only point which is taken into consideration when one decides among rival theories or theory-variants:
- The information loss resulting from the rejection of a hypothesis may be felt less tolerable than the inconsistency between this hypothesis and data.
  - The plausibility values of Prinz & Wiese's (1991) hypotheses differ: there are better supported and less supported ones among them.
  - While a proposal based on the simultaneous maintenance of both members of (I) seems to be basically tolerable from both a linguistic and a logical point of view,<sup>8</sup> the methodological rule that only positive test results have to be taken into consideration, turned out to be controversial. Thus, it seems that consistency cannot be secured at all costs, by whatever means.

These concerns pave the way for the conclusion that the inconsistency between (I)(a) and (I)(b) *cannot be resolved* within Prinz & Wiese's (1991) framework, either. Accordingly, the solution to (P)(b) is as follows:

- (SP) (b) The basic inconsistency of German affricates did not become *solvable* within Prinz and Wiese's approach, either, although they made use of a considerably wider range of criteria as well as the Combinative Strategy. The reason for this is, above all, that the conflicting test results could not be separated from each other. As a consequence, one of

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<sup>8</sup> For the latter, see (xi) in Section 2.

the p-contexts (the one summarising information related to the CV-tier) turned out to be p-inconsistent.

## 6 On (P)(c)

In advance, it seemed that there is a kind of *linear progress* in the treatment of German affricates. While Wurzel's eclectic framework, applying both notions of structuralist phonology and SPE, yielded an irresolvable inconsistency, the later development of phonology such as CV phonology raised the hope that the latter could be void of the shortcomings characterising the earlier approach. A short comparison of (SP)(a) and (22) reveals, however, that although Prinz & Wiese's (1991) approach is clearly better from several points of view, there are also similarities with respect to the treatment of the basic inconsistency of German affricates. Thus, on the basis of our analyses conducted with the help of the p-model, the following solution to (P)(c) presents itself:

- (SP) (c) On the one hand, it is a well-known tenet of the philosophy of science that striving for the resolution of inconsistencies is one of the driving forces of theory formation, and that the resolution of a contradiction often leads to the emergence of further contradictions.<sup>9</sup> Our analysis of the two approaches to German affricates illustrated this manifestly. On the other hand, however, the application of the p-model goes far beyond this tenet and provides a series of new insights into the methodology of linguistic inquiry:
- The Contrastive Strategy is not suitable for the resolution of an inconsistency in cases in which both rival hypotheses have a relatively high plausibility value.
  - That is, if both rivals are strongly supported by evidence, then their rejection would usually lead to a too great amount of information loss.
  - The failure of the application of the Contrastive Strategy often leads to the employment of the Combinative

<sup>9</sup> Even so different philosophers of science as Kuhn and Popper devoted much space to the discussion of this tenet.

Strategy, because it seems to be reasonable to keep both conflicting hypotheses.

- If the separation of the conflicting statements into distinct but complementary p-contexts is well-motivated, then *this inconsistency can be permanently tolerated and may lead to a more comprehensive, more complex theory*.
- It is often the case that one cannot reach a p-context that is p-consistent, or contains only permanently tolerable p-inconsistencies and is not burdened with informational underdetermination, either.
- Therefore, the temporary tolerance of p-inconsistencies may be the best solution.
- The temporary tolerance of p-inconsistencies, however, cannot happen in an *ad hoc* manner. Rather, it seems to be rational to formulate the methodological rule that an inconsistency can be tolerated temporarily only if the "disobedient" cases possess some common characteristics.
- This requirement is in perfect harmony with the idea that science is about seeking answers for *why-questions*. That is, if the "disobedient" cases possess some common characteristics, then the next step of the theorising process is already given: one has to find the reason why linguistic items with a certain feature behave differently.
- Consequently, inconsistencies are *not* failures of the researcher or of the theory at issue. Rather, they are *constitutive* components of the plausible argumentation process that trigger the retrospective re-evaluation of data and hypotheses and, via this, significantly contribute to the *effectiveness* of linguistic theorising.

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